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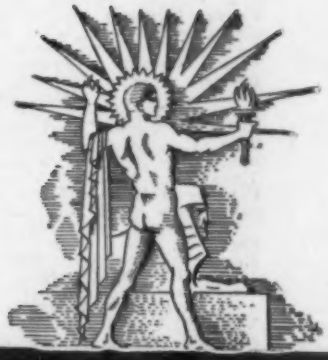
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE•



AUGUST 25, 1934

Oklahoma Earring

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SCIENCE NEWS LETTER

VOL. XXVI *No. 698*

The Weekly Summary of Current Science

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DO YOU KNOW?

There are six kinds of lightning: ball, bead, ribbon, rocket, streak, and zigzag.

The Field Museum herbarium, in Chicago, now contains over 700,000 plant specimens.

Photographs showing that lightning does strike in the same place twice, or more often than that, have been obtained by electrical engineers.

The Soviet Union has almost 800 engineers and chemists, all young, at work on research connected with synthetic rubber.

A psychologist, collecting fragments of conversation, reports that weather is far from the favorite topic; business, men, and clothes are much more discussed.

A new family of wood-boring insect immigrants almost slipped into the United States recently when a customs inspector found them in the wood of an old oil painting.

Europe expects to harvest an unusually big walnut crop this year.

The United States' birthrate declined from 38 per thousand in 1870 to 18 per thousand in 1931.

Why cocks crow at midnight is being investigated by a French astronomer who says he has often heard and noted the time of this crowing.

The longest incandescent lamp in commercial use is the "yardstick" so called because it stretches light along a 34-inch tungsten wire.

In five years, the plant at Amarillo, Texas, has produced more than 57 million cubic feet of helium, or about half of all the helium ever recovered in the world.

Tuberculosis was once so poorly understood and so feared that one Congressman introduced a bill to require a tuberculous person to wear a bell or rattle to warn all other people.

WITH THE SCIENCES THIS WEEK

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PHYTOPATHOLOGY
How are plant diseases fought? p. 115. *The Scientific Principles of Plant Protection—Hubert Martin—Longmans, Green,* 1928, $8.40.

RADIO
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VETERINARY MEDICINE
How can X-rays help sick animals? p. 121.

ZOOLOGY
Is a rattlesnake born with a "button"? p. 126.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, postpaid in the United States.

AGRICULTURE

United States Has No Monopoly of Misfortune

Drought a Disaster Shared by Whole World, Department of Agriculture Survey Shows

THE DROUGHT, like the Depression, makes itself felt as an international disaster, and not merely as a misfortune to one nation. A study of the new report on the drought situation issued by the U. S. Department of Agriculture brings home this point most impressively.

The roll of countries that could answer "Trouble!" in the drought line-up reads almost like a roster of the world's best farm lands. Russia: little wheat to export this year. Germany: livestock must be slaughtered; not enough feed. Poland and the countries of the Danube Valley: grain crops short. China: rice in the Yangtse valley badly damaged.

Our nearest neighbors, Canada and Mexico, have had to take their share of the punishment that has fallen across the American grain belt. And most remote, Australia, away "down under," already reports reduction in grain crop seeding because of dry weather. Argentina, the other great Southern Hemisphere grain land, has somewhat the same story to tell.

Yet in spite of what threatens to be a bad crop year throughout the world, it seems unlikely, the report states, that there will be a world shortage of bread grains. As in the United States, so in other lands, the large carry-over of wheat and other cereals is expected to prevent the nations' cupboards from being found bare.

Serious the situation unquestionably is; but it is not regarded as alarming. And if there is any consolation to be derived from the realization that we are all in the same boat, a large part of mankind is entitled to that reflection.

Taking a closer look at the domestic situation, the report is most pessimistic about the condition of the corn crop. There is "practically a total failure of the crop, so far as the grain is concerned, in an area including the major parts of Nebraska, Kansas, Missouri and South Dakota and in parts of southern Iowa and west central Illinois. . . Even the production of corn fodder was seriously reduced in the drought area."

Pastures are stated to be generally in bad shape, and the crops of grain sorghum and other plants used mostly for stock feed not encouraging in prospect. The prospective hay crop suffered a decline of seven per cent. during the month. With short pastures, with only about 65 per cent. of the usual quantity of grain available for feeding, and with other unfavorable factors at work, "a rather drastic adjustment in the number of livestock will have to be made before fall and winter feeding begins."

Food for human beings, however, is entirely adequate, the report reassures. There may be local shortages in places, which will have to be ironed out by larger shipments than usual. But taken on the whole: "Stocks of bread grains and several other food products are large. Production of most canning crops will be about normal, fruits and vegetables fairly abundant outside the drought area, and the supply of meat, dairy and poultry products adequate for the remainder of the year."

Science News Letter, August 25, 1934

PHYTOPATHOLOGY

War Against Plant Diseases Waged By Government

WITH DROUGHT already seriously curtailing crop prospects, plant diseases assume more than ordinary importance, so that Government scientists are redoubling their efforts to beat down these fungous enemies that increase the farmer's per-bushel cost and correspondingly cut his profits. In a talk given in Boston, Mass., under the auspices of Science Service, F. C. Meier told of methods that can be and are being used in this warfare. Mr. Meier is Senior Agriculturist in the U. S. Department of Agriculture, and secretary of the American Phytopathological Society.

The most obvious method of getting rid of a plant disease is to spray the plant with something that will kill the fungus. Next comes the breaking of the complex life cycles of some of the fungi, which spend part of their lives on one plant species and part on another.

More important still is the development, by scientific plant breeding, of disease-resistant varieties of plants.

Defeating plant disease is of importance in times of abundance no less than in times of drought, however, Mr. Meier said. He continued:

"It is necessary to a planned production of agricultural crops. Uncontrolled reduction in yield due to the ravages of disease is one thing and a decrease in production due to a purposeful and intelligent limitation of acreage which when planned is given proper protection, is quite another. In the first case, we have uncertainty and waste of labor, land and expenses incident to growing the crop; in the second case, we have economy and some certainty of obtaining normal production."

Science News Letter, August 25, 1934

THE GIANT ROARS

Greatest spectacle in Yellowstone Park is an eruption of the Giant geyser, but few of the quarter million persons visiting the park each year catch a glimpse of the famous gusher. Here the Giant is shown in the only eruption of the present park season, when it gave a two-hour display on August 2. Park visitors had waited from May 5 for this eruption, but when it came, the wait seemed justified, for the column of steam and boiling water shot into the air 250 feet to dwarf Old Faithful.

ANTHROPOLOGY

Multiple Births Rare Among Human Beings

Dionne Quintuplets One of Not More Than Thirty-Five Such Cases Authentically Known to Science

This is the first of a series of two articles on multiple births in human beings, prepared by Science Service because of the great and sustained interest in the Dionne quintuplets born recently in Canada.

MAN USUALLY comes into this world as he leaves it—alone.

That is why the Dionne quintuplets create such interest.

Double births are common enough so that you probably have among your own acquaintances at least one pair of twins, but births of numbers larger than two are extremely rare. Not over about 35 authenticated cases of the birth of quintuplets, like the Dionne set of five, have been recorded in medical history.

Not over a half dozen cases of the birth of six infants at one time are known to science.

Such multiple births have been reported much oftener, and newspaper dispatches from foreign parts have recently told of cases of six, seven, eight and even ten infants born on a single occasion. Such reports, however, are usually from great distances, and are without verification. Scientists suspect either a garbling or exaggeration in the transmission of the tale, or a more or less deliberate hoax.

Six is Maximum

For those who have studied human anatomy believe that if more than six children were crowded together within a single mother, they must of necessity be so small that they could not possibly survive, unless it should be with the most modern methods of care for premature and under-developed infants.

Nevertheless, in the old town of Hameln, famed for its Pied Piper and the children who flocked after him, a tablet on the front of a house commemorates the birth of seven children at one time at 3 o'clock in the morning on January 9, 1600.

This tablet's inscription may have been a slight and pardonable exaggeration on the part of some early booster committee or Chamber of Commerce, or it may be a fable like that of the Piper himself or the story of Lady Margaret, Countess of Holland, who is reputed to have given birth in 1313 to no less than 365 children at one and the same time.

The survival even of quadruplets is extremely rare. So far as is known, the lovely Keys girls, now distinguished students in Baylor University, Texas, are the only quadruplets who have grown to adulthood in this country.

The Dionne quintuplets are the only ones positively known to have had even one of their number live as long as ten weeks.

Scientists, whether they are physiologists, psychologists, educators, or physicians, have much to learn from the five Dionne babies. The longer these five children born at a single birth survive, the more remarkable is the opportunity they offer to those who wish to know more about the human race.

Two Kinds of Twins

The part that heredity plays in determining the course of daily life, from the psychological point of view as well as the physical, is one problem that these little girls may help to solve.

Twins—and also quintuplets—may be of two kinds. What are known as identical twins have their origin in a single egg cell which becomes separated into two individuals very early in the embryonic development. These identical twins have exactly the same heredity from both father and mother. They look so exactly alike that even their parents have difficulty in telling them apart; they are similar in intelligence, in tastes and in interests. They are subject to the same diseases so far as these, or a tendency toward them, are hereditary.

Any differences observed between identical twins are known to be the result of environment, of their individual experiences, accidents, or opportunities.

But a great many twins are not of this identical type. They do not come from a single egg cell, but are merely ordinary brothers or sisters who happen to be born at the same time. Often they are not at all like each other either in appearance or in character. They may not even be of the same sex.

By comparing identical twins and non-identical, or fraternal, twins, by noticing how the former differ and how the less closely related pairs resemble each other, scientists can arrive at deductions regarding the part played by heredity and environment.

Any careful scientific experiment, however, needs a "control." In order to be sure that the identical twins resemble each other in some respect more than would ordinary brothers in the same family, it is necessary to compare them with other brothers. In the case of twins, the brothers are, however, older or younger and are brought up under slightly different conditions.

Triplets, quadruplets, and quintuplets may offer the ideal control the scientists seek.

Several Possibilities

The Dionne quintuplets may be related to each other in a number of different ways. Two of them may be identical and the rest fraternal. There may be two pairs and a single "odd" one. Or they might conceivably be all fraternal, although this is not at all likely.

It is not possible to tell as yet just what the relationship is. One indication of a single-egg origin lies in the report that only one nourishing organ was observed for all five infants. This evidence is not conclusive because of the fact that in the confusion of such a complex delivery a mistake might have been made and because even when a multiplicity of such organs exists they sometimes grow together so that they seem to be only one.

At birth, identical twins may be just as different in appearance as are fraternal twins, so that the difference in size and weight of the Dionne infants is not an indication that they are not identical. But as they grow older, these differences become less obvious in identical twins, more obvious in those who are non-identical.

Life in an Incubator

After the Dionne babies have passed through the first years of their lives, measurements of their bodies, the color of their hair and eyes and texture of skin, the grouping of their blood, the scores they can attain on mental tests, and their fingerprints will disclose definitely whether they are identical or not.

The little Dionne quintuplets share

with thousands of American infants the perils of starting life in an incubator. A large hospital having over a hundred births a month will have about one infant a month that comes into the world so tiny and frail that it must be placed within the mechanical mother to cherish the spark of life within it.

The normal child weighs about seven pounds at birth, and all infants weighing less than five pounds are candidates for the incubator. The Dionne babies were born about two months early, and because there were so many of them they weighed much less than the ordinary premature infants; their combined weight was reported as only 13 pounds, 6 ounces.

Feeding by Drops

Babies in the incubator, as a rule, gain weight rapidly. They are fed on human milk whenever that is possible, and it is dropped into the tiny mouths with a medicine dropper, since they are generally too weak to nurse at first. The total ration is only about two teaspoonsful every two hours at first, yet that is plenty for such tiny mites.

Oxygen must be provided for the breathing of some of the infants. For those who do not require oxygen, ventilation is provided by the open top of the incubator.

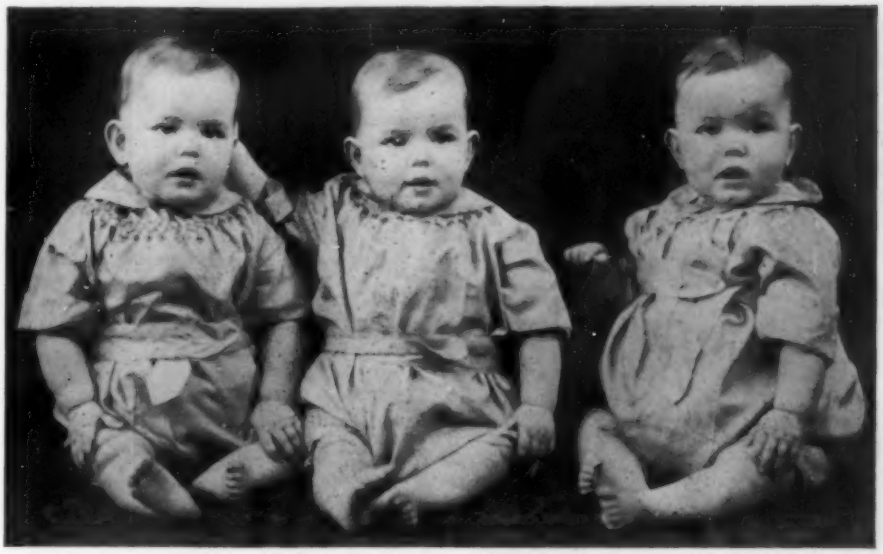
The temperature is kept constant by electricity, or by some other means where electricity is not available. The incubator is kept much warmer than the air of the ordinary nursery—from 95 to 98 degrees Fahrenheit is considered just right. This keeps the body temperature of the infant at 98 or 99 degrees.

The Climbing Curve

The babies must be turned frequently so that they will not develop pneumonia from remaining too long in one position. Occasionally they must be lifted out of the incubator, but, in general, all the care, bathing, feeding, and changing is done right there in the human nest.

The incubator baby is not weighed every day as is the normal infant, but is weighed every other day, and all those having to do with his care are interested in watching the line on the weight chart turn upward.

Very great success in the saving of precarious lives has resulted from the use of the incubator, which was first designed for use in the Paris Maternity Hospital in 1880.



OTHER NOTED CANADIANS

This set of identical triplets, born in Canada several years ago, not only lock alike but developed alike: they were all left-handed, all slow in learning to walk, and all teethed at the same time.

AGRICULTURE

Department of Agriculture Will Not Slacken Research

THE U. S. Department of Agriculture, under the administration of Secretary Henry A. Wallace, has not slacked its zeal for scientific research, and does not intend to do so, even in the face of price-crushing surpluses which the American agricultural plant inevitably produces if left to itself under present world conditions. The answer to the dilemma of the surpluses is not lessened production through inefficiency but controlled production through governed efficiency, Secretary Wallace declares in the new U. S. Yearbook of Agriculture, just issued by the Government Printing Office.

He says: "From its start the United States Department of Agriculture has promoted efficiency on the farm. Efficiency in the old sense of the word, however, is not enough. As farmers well know, profits can not be got just by improving plants and livestock, by fighting disease and pests, or by reducing the wastes of marketing. That alone is not efficient. Ordinary technical efficiency reduces only the cost of production; under present conditions it is necessary also to adjust the output to a changed world market. Low-cost production may mean loss to the farmer if it is excessive production."

Secretary Wallace points with equal pride to the continued progress of his department in its traditional work of developing better crop plants and fighting pests and diseases, and to the determined new venture into applied agricultural economics, assisting those who wish to cooperate in holding their production at a profit-paying level.

"These two kinds of departmental activity do not conflict but go together," he declares. "Economic adjustment and technical research are necessary mutual supports, particularly just now. Even in normal circumstances it is difficult to prevent a clash between technical efficiency and profitableness in farming. As more and more farmers adopt the latest methods, their aggregate production increases until prices fall below costs. In periods of great overproduction, increased efficiency is a very mixed blessing, if farmers do not counteract its tendency to swamp the market. They can not do so profitably by ceasing to be efficient. Such a course would increase costs more than it would increase prices, and would give an advantage to competing countries. The only workable experiment is economic adjustment.

"Agriculture needs not less science in its production, but more science in its economic life. We may usefully distinguish between productivity and production. Real efficiency increases the former but not necessarily the latter. Farmers can not have too much productivity or production power, provided they keep it under control. High productivity means low unit costs. With efficient economic as well as efficient technical practice, farmers can make productivity their servant. It is half-science that turns research into a Frankenstein, and leads to demands for a halt in technical progress. Full science, embracing the distribution as well as the production of wealth, reconciles the conflict."

Science News Letter, August 25, 1934

FORESTRY

Forest Fire Toll Mounts, Influenced by Drought

HIGH on the list of national woes that have arisen from the drought, 6,973 desolate, fire-blackened areas record this year's destruction from forest fires.

This number, just totalled by the U. S. Forest Service, shows an increase of 2,727 individual fires over an average taken for the same period during the last three years.

The area burned is estimated at 183,000 acres, equal to nearly one third of the area of the State of Rhode Island.

Of the total number of fires 3,727, or 53 per cent., were said to be "man-caused." Some were incendiary, but officials of the Forest Service do not know just how many. The rest were the result of carelessness, springing up from burning cigarettes, neglected camp fires, or other such causes.

"Class C" fires, those that burned an area of more than ten acres each, numbered 1,326. Several of these invaded the United States from over the Canadian border, one crossing over the frontier into the Coleville Forest over a three-mile front.

Lookouts Efficient

The "extra-period fires," those that lasted through noon of the day following that on which they were reported, totalled 183. This relatively small number emphasizes the efficiency of the lookouts who scan vast tracts of territory from lonely mountain tops, locating immediately and accurately the first trace of smoke in the unpopulated timberland far below.

Cross-bearings telephoned to other stations are necessary in determining the exact position of a tiny blaze which may soon develop into a roaring inferno. It is then a question of how soon men can arrive on the scene to check the wall of flame. Armies of more than 2,000 volunteers have a number of times had to battle for days before the last spark was out.

The number of fires increases each day, especially in Washington and Oregon with their huge areas of unpeopled forest. New fires are springing up continually, many of them raging uncontrolled for several days.

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ECONOMIC ZOOLOGY

International War Urged Against Animal Parasites

MEN OF ALL nations should take international action to fight against their nationless foes, the parasites of animals that supply us with milk, meat and clothing. Such a militant league of science was urged upon the Twelfth International Veterinary Congress by Dr. Maurice C. Hall of the U. S. Department of Agriculture.

"The spread of parasites in international trade calls for international action, as Skrjabin has pointed out," said Dr. Hall. "Such international action calls for international cooperation to prevent undue damage to international trade. . . .

"Unfavorable conditions confronting our program of parasite control include excessive nationalism, the existence of many local governmental units, gaps in our knowledge due to insufficient research, and widespread failure to use control measures already established as of value. The magnitude of our control problems is not yet adequately esti-

NEW FOREST FIRE HAZARD RECORDER

A forest fuel hygrograph, indicating and recording the main factors of forest hazard, has been developed at the U. S. Forest Products Laboratory, Madison, Wis., and has been tested in service at the Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont. The instrument records the degree of dryness of forest leaf litter or duff and of the slash or branch-wood that is left after logging, as well as average wind velocities. Since its indications continuously translate atmospheric conditions into a direct gauge of the inflammability of forest materials, this hygrograph is welcomed by forestry officials.

mated or appreciated.

"Favorable conditions for our program include increasing research and interest in parasitology, a rise in the general cultural level, a betterment of the basic economic status of the world, and the existence of large veterinary and zoological groups interested in parasitology and the control of parasites.

"When visualized and dramatized as a form of warfare, the subject of parasite control becomes much clearer as regards its magnitude and the methodology which we must develop."

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MEDICINE

Liver Extract Conquers Sprue, Tropical Chronic Ill

LIVER, already the salvation of those suffering from pernicious anemia, promises to conquer a troublesome and chronic ill of the tropics, called sprue. Drs. C. P. Rhoads and D. K. Miller of New York City have produced clinical cures of four cases of sprue which did not respond to the treatment that previously was considered standard. They injected liver extract into the veins or into the muscles.

Sprue is a chronic disease marked by sore mouth, with a raw-looking tongue and gastro-intestinal effects. It occurs mostly in hot countries and causes emaciation, anemia and frequently death. The liver is known to diminish in size. The four cases benefited by liver extract were developed in Puerto Rico or China.

In their report to the American Medical Association, Drs. Rhoads and Miller explain that sprue requires more intensive treatment with liver extract than does pernicious anemia. Thanks to the researches of Drs. G. R. Minot and W. P. Murphy of Boston in 1925, it was found that liver is specifically effective in the cure of pernicious anemia. Liver was first used in 1927 to treat sprue by Drs. A. L. Bloomfield and H. A. Wyckoff in California. Other work by Dr. W. B. Castle and his associates of Harvard Medical School revealed the relationship of diet, vitamin B, gastric secretion and absorption within the body.

The contribution by Drs. Rhoads and Miller is the demonstration that relatively large amounts of liver extract must be injected into the muscles or into the veins so that this material, which is lacking in the patient's body, may be immediately available.

Science News Letter, August 25, 1934

GEOLOGY

Niagara's Rock Slide Only Minor Incident

Great Waterfall Has Known Thousands of Them; Wearing of Falls Price of Having Them at All

NIAGARA created another nation-wide sensation by staging a bit of rock-slide on Monday, Aug. 13. Doubtless it will arouse all over again the discussion of various projects for "saving" the falls from the fate their natural erosion may bring them, as it did the last time there was a good-sized rock fall, on Jan. 17, 1931. But it's all a very old story to Niagara.

Some time between twenty-five and fifty thousand years ago, when the Ice Age on this continent was just ending and the Great Lakes, as we know them today, were still young, there were five Niagaras instead of only one.

The remains of these great falls have been found by geologists at a point quite remote from their single surviving sister. They thundered for centuries, with no human ear to hear them, in the region where Syracuse now stands. They were left high and dry when the level of the upper great lakes fell, and all the outlet water was concentrated in a single river, the modern Niagara.

When the modern falls first started running they were about seven miles down-river from their present position. They have been backing up ever since, so that the recent rock fall is only a trifling incident in the whole history of the carving of the Niagara gorge.

Niagara's Tools

The existence of Niagara Falls depends on the presence of a sheet of hard limestone overlying a thick bed of less resistant sandstones and shale. The churning water at the bottom of the falls, filled with broken fragments of hard rock, carves away the softer material from under the over-hanging edge whence the waters leap. From time to time pieces of the limestone break off. Usually they are small; the recent slide, and the one that occurred three years ago, were exceptions. Thus the falls keep young by constantly peeling off bits of their face.

The history of the falls has been the same throughout their millenia of life up to the present. There will come a time, however, when there will be no more Niagara as we know it today, but a tumultuous series of cataracts dashing through tumbled gigantic boulders.

This is because the capstone which forms the river-bed at Niagara dips slightly toward the south. Several miles upstream it disappears under a stratum of softer rock, which is not capable of forming a resistant rimrock for the river to jump from. When the river finally backs up to this place, it will scour down through the soft stuff until it finds the limestone, break this up in great pieces and thereafter flow foaming and spouting through the obstacles it will thus pile up for itself.

But the generation that will see this still waits for a wholly undeterminable future.

Science News Letter, August 25, 1934

BOTANY

Drought-Resistant Grasses For West Sought in Asia

DROUGHT-resistant grass species, to be used in rebuilding the depleted rangelands of the West, are to be sought in central Asia by an expedition from the U. S. Department of Agriculture.

On the edge of the Gobi Desert there are great natural grasslands, which have been pastured for thousands of years by nomad tribes, without any sign of exhaustion. In this region the temperature ranges from 100 degrees Fahrenheit in the summer to 40 degrees below zero in the winter, and severe droughts are frequent. Yet the grasses survive, and the herds of livestock and game thrive on them.

The leader of the expedition will be Prof. Nicholas Roerich, veteran explorer of interior Asia, from Kashmir to the Altai mountains. With him will be his son, George Roerich, an expert in Central Asiatic languages, and two U. S. Department of Agriculture specialists in grasses, H. G. MacMillan and J. L. Stephens.

Science News Letter, August 25, 1934

ASTRONOMY

120-Inch Flat Mirror Now Being Ground

TWO skilled California Institute of Technology workmen have started the largest optical job since the 100-inch mirror was completed for the world's largest telescope on Mount Wilson.

Preliminary grinding of the 120-inch pyrex mirror, to be used in testing the final surface of the 200-inch "eye," shortly to be recast at Corning, N. Y., is under way. By spring it is expected the surface of the disk will be ground flat to within a hundred thousandth of an inch of perfection. Preliminary grinding is to continue until bubbles on the surface are removed.

Machinery weighing between 40 and 50 tons is used to prepare the mirror's face for use. It is housed in a huge one-room, cork-lined laboratory building designed to keep a constant temperature which is needed to prevent distortion of the glass.

The grinding tool is fastened to an arm controlled by a series of motors. Each motor gives the tool a different motion over the heavy mirror. One man, at switches, controls these operations. The other watches the progress of the grinding and supplies the necessary amount of carborundum, the grinding substance.

The grinding is done on an NRA week of five days of eight hours each.

Science News Letter, August 25, 1934

PALEONTOLOGY

National Museum Gets 2,000,000-Year-Old Horses

OUT IN IDAHO, near the town of Hagerman, Dr. C. Lewis Gazin, paleontologist of the U. S. National Museum, is busy putting bones into plaster-of-Paris casts. They are not all broken bones; many of them are whole. They are not human bones; they are horses'. And the horses have been dead for over two million years.

Dr. Gazin's job of inverse veterinary surgery has already used up half a ton of plaster-of-Paris. The bones thus bandaged, to insure them against breakage, are to be shipped to the U. S. National Museum in Washington where they will form a notable addition to the great collection of horse fossils already obtained from the same site.

This quarry has proved to be a veritable mine for the remains of the extinct horse genus known as *Plesippus*, an animal that roamed the American West during the pliocene geologic period, immediately before the coming of the great Ice Age. *Plesippus* closely resembled the modern horse in size and general appearance but certain details of structure set him apart as a separate genus.

Along with the horse bones, Dr. Gazin has found considerable numbers of bones of other extinct mammals that were the contemporaries of *Plesippus*. These he is also packing for shipment to the Museum.

Science News Letter, August 25, 1934

CHEMISTRY

Milk Product Glazes Paper For Fine Printing

THE HIGHLY polished surface on the paper in the better magazines, which makes possible the beautiful colored pictures and fine printing, comes from—of all things—skimmed milk.

The glazed surface consists of casein pressed into the paper. Casein is obtained from the curd, after the whey has been separated from it.

A new machine which manufactures casein in one continuous process and produces a product rivaling casein imported from abroad is reported to the American Chemical Society by Dr. Richard W. Smith, Jr., of the University of Vermont.

For good printing the casein should have uniform quantities, and when paper manufacturers make fine paper by practically the square mile it is difficult to maintain the uniformity everywhere.

In the new process, developed by F. L. Chappell of Hobart, N. Y., the skimmed milk is separated into the curd and whey continuously and each chemical step taking out the impurities follows the one before it in sequence.

"The finished casein is superior to that made by other methods," Dr. Smith declares. "The whey also obtained contains lactose, inorganic salts and some residual albumin. It is utilized in several ways. It may be evaporated direct to powder to yield a valuable feed for poultry and stock; it may be worked for its lactose content; it may be fermented to yield lactic acid, or, as has been recently proposed, its albuminous constituents may be separated and used."

Science News Letter, August 25, 1934

IN SCIENC

CHEMISTRY

Fertility Vitamin E Absorbs Ultraviolet Rays

HOPE, long-held, that the fertility vitamin E would absorb light in a distinct, characteristic fashion and thus make possible a positive identification appears to have been achieved by workers at the Dunn Nutritional Laboratory of the University of Cambridge. Reporting to *Nature*, Drs. A. J. P. Martin, T. Moore, Marion Schmidt and F. P. Bowden describe experiments on the spectrum analysis of vitamin E.

By dissolving vitamin E, prepared from wheat seed germs, in alcohol the British workers found that a sharp absorption occurred at the wavelength 2900 Angstroms when they shone light through it. This wavelength is in the invisible ultraviolet region, near the actinic rays which produce sunburn.

The key test in the research was to show that the vitamin E which produced this characteristic absorption really produced a biological effect when given to experimental animals. Such an effect was found, say the investigators, "for the vitamin caused a female rat which had shown characteristic resorption gestation to produce a litter of eight live young."

Science News Letter, August 25, 1934

OCEANOGRAPHY

Bathysphere Record Set At 3028 Feet Under Sea

WILLIAM Beebe and Otis Barton, established a new "low" for personal deep-sea exploration when their bathysphere descended to a depth of 3028 feet beneath the surface of the sea off the shores of Bermuda on Wednesday, Aug. 15.

With this "deep down divin'est" record, exceeding the half-mile dive they had set as their goal, the two men announced themselves as content. They will now make a series of bathysphere descents to shallower levels, to study marine life "at home."

Science News Letter, August 25, 1934

NCE FIELDS

ASTRONOMY

Astronomers Search For Comet Seen in Europe

AMERICAN astronomers are on the watch for a faint periodic comet which has been rediscovered in Europe. Harvard College Observatory, the collecting center for astronomical information, was notified of the discovery and, in turn, sent the details to American observatories.

The comet is of the twelfth magnitude, which means that it is much too faint to be seen with the unaided eye or even through a small telescope. It is low in the eastern sky as seen from the United States, somewhat east of the constellation of Pisces.

Science News Letter, August 25, 1934

PHYSICS

Gamma Rays Split Apart Heavy Hydrogen Atoms

GAMMA rays, the same kind of radiation used medically for the treatment of cancer, are now being employed to produce artificial disintegration of atoms of the "heavy" hydrogen isotope, deuterium. The atom breakup achieved throws new light on the composition of the newly discovered "heavyweight" kind of hydrogen.

Prof. James Chadwick and Dr. M. Goldhaber of Cambridge University report to *Nature* that by bombarding diplons (deuterium atoms which have lost an electron and become ionized) with gamma rays having energies of 2,620,000 volts they have produced ordinary lightweight hydrogen atoms, and neutrons.

Diplons are known in America as deutons. They are much used as particles with which to bombard other substances and so cause disintegration. As ionized atoms of deuterium, diplons have twice the weight of ordinary hydrogen atoms.

Drs. Chadwick and Goldhaber indicate that to break down the diplons into their two constituent parts the bombarding gamma rays must have energies greater than the forces which normally hold the particles together. This condition is satisfied with gamma rays of 2,620,000 electron-volts energy.

The new discovery is expected to make possible more accurate estimates of how much a neutron weighs, a point on which various investigators differ at the present time.

A neutron is thought by some to be a composite particle consisting of an extremely close union of particles with positive and negative charges so tightly bound that there is no measurable external electric field. It weighs as much as a hydrogen atom but is much more tiny, and hence more penetrating when it strikes some other substance. So piercing is a neutron that it is difficult to distinguish between it and the packets of radiation called photons.

Science News Letter, August 25, 1934

VETERINARY MEDICINE

Animal Hospitals Now Use Modern X-Ray Methods

X-RAY examinations and surgical attention such as are now standard in the treatment of human hospital cases should be available for sick animals also, Dr. Alois Pommer, Viennese veterinarian, told the Twelfth International Veterinary Congress at its New York meeting last week. He added that medical treatment for animals is hindered in many cases by lack of X-ray apparatus and roentgenologists giving their full attention to veterinary work. Vienna's Veterinary College has established a central Roentgen institute, which aids the practitioners in animal surgery, internal medicine and obstetrics.

An increasing use of anesthetics and aseptic surgery has occurred in Great Britain's veterinary work, Sir Frederick Hobday, principal of London's Royal Veterinary College, reported. Animals are being given anesthetics as a customary procedure, chloroform being used on horses, cows and mature dogs, while puppies and cats are usually given ether or mixtures of chloroform and ether. There has been research on comparatively new anesthetics, avertin and nembutol.

In the United States, also, Dr. W. F. Guard of Ohio State's College of Veterinary Medicine reported, there has been marked improvement in the use of anesthetics and surgery. Great advances have been made in the general application of local anesthetics to all species of animals.

Science News Letter, August 25, 1934

RADIO

Radio Reception Affected by Moon

DOES THE MOON affect radio reception? Do owners of radio sets get stronger signals when the moon is full than when it is waning?

Dr. W. W. Perrett, Moravian missionary stationed at Hopedale, Labrador, has been keeping a log of radio reception on his set since 1925 and finds that the height of the ocean tide indicates times of good and bad reception, especially fading. The ocean tides, of course, are caused by, and follow, the position of the moon.

Despite the fact that Dr. Perrett is very near the "home" of the Aurora Borealis, or Northern Lights, this phenomenon does not markedly influence radio reception at his station.

The correlation between tides and radio was described by Dr. Perrett in a communication to E. F. McDonald, Jr., president of the Zenith Radio Corporation of Chicago.

In believing that the moon exerts a positive effect on radio, Dr. Perrett is supporting results already obtained by such men as Prof. Harlan T. Stetson, astronomer at Perkins Observatory, and Dr. G. W. Kenrick and G. W. Pickard.

Dr. Stetson has found that there is a daily lunar cycle of radio signal strength. The signals have a minimum intensity when the moon is forty-five degrees above the horizon and a maximum when the moon is thirty degrees below the horizon.

Dr. Kenrick and Mr. Pickard have found that there is a monthly variation of radio signal strength with emphasis on a half period, 14.75 days, and a full period of 29.5 days.

Science News Letter, August 25, 1934

SEISMOLOGY

Earthquake Located East Of Philippine Island

THE EARTHQUAKE that was recorded on seismographs all over the world, on Sunday, Aug. 12, had its origin in a deep portion of the ocean east of the Island of Mindanao in the Philippines. The location was determined by the U. S. Coast and Geodetic Survey from information furnished by Georgetown University, Manila and Honolulu observatories. The time of the quake was 6:49 p. m., E. S. T.

Science News Letter, August 25, 1934

ETHNOLOGY

What Hiawatha Was Made Of

Longfellow Created Hiawatha From Two Other Heroes And an Indian God, While Real Hiawatha Lay Forgotten

By EMILY C. DAVIS

HIAWATHA had a past Longfellow never knew about.

Movie stars, it seems, are not the only ones to lose their own pasts and become new personalities in the hands of a miracle-working press agent.

Longfellow made a new man of Hiawatha. He did it unconsciously, never dreaming that the Hiawatha he was immortalizing was a vastly different hero from the flesh and blood Hiawatha. But as a result of Longfellow's poetry, the literary—artificial—Hiawatha is the most famous Indian in America. The Hiawatha of history became a submerged personality.

Scientific research has brought the historic Hiawatha to light, and straightened out the mystery of what Longfellow's Hiawatha is "made of."

The real Hiawatha is disclosed as a cannibal. We may as well face that shuddery fact first. He reformed, it should be added hastily in fairness to him. And he had provocation, plenty of it, for doing something mad and desperate.

Cannibalism as Sublimation

Cannibalism happened to be an Indian way of taking it out on somebody else when you couldn't strike back at your real enemy. Nowadays, a man who couldn't strike back directly might try to get even with the world by bullying his office force, or, he might turn into an unscrupulous sharper in business.

The real Hiawatha lived about 1550 A.D. He had a genius for political planning. He lined up with an even greater Indian genius, and the result of that team was something new in government for Indian tribes. From their revolutionary scheme of Indian government, Jefferson seems to have got his inspiration for our United States of America. Without Hiawatha there might have been no United States as we know them.

All this being the case, Longfellow's "Song of Hiawatha" is a curious memorial to a great man.

If the real Hiawatha that Longfellow never knew could stride back from the happy hunting ground where he has been hunting all these four centuries, and if he found his way to a modern public school, he would be a puzzled redskin. He would hear seven-year-olds piping lustily in his honor:

"Smiling answered Hiawatha:
'In the land of the Dacotahs
Lives the Arrow-Maker's daughter,
Minnehaha, Laughing Water.'"

A Disillusioned Ghost

For half an hour, the distinguished unseen guest would listen to rippling lines about Hiawatha's bride Minnehaha, Hiawatha's ingenuity in concocting a birchbark canoe, Hiawatha's success in bringing the gift of corn from the gods to the Indian. And after that, we can imagine the shade of Hiawatha stumbling forth, and murmuring sadly to himself (doubtless, by this time, in Longfellowian meter):

"And I thought my deeds remembered.
Such is fame—O Hiawatha!"

As a matter of prosaic fact, Hiawatha's ghost has not been reported haunting schoolrooms. But the revival of Hiawatha's career and character is as impressive as the return of his ghost would be.

The real Hiawatha has one man in particular to thank for his rescue from oblivion. That man is J. N. B. Hewitt, an ethnologist who specializes in digging out the facts about the Iroquois tribes.

Up in his tower-office in the old Smithsonian Building in Washington, Mr. Hewitt has a stack of big envelopes containing the history of Hiawatha and his people. It is a long story—187 pages of manuscript. Mr. Hewitt took it down, translating as he went, from the dictation of a blind Iroquois Indian. Not once in the long recital, continued from day to day, did that blind Indian hesitate over his facts. He had learned tribal history so well long ago that he could still repeat the lessons.

This Indian had been taught in the old-fashioned way by the elders of the tribe. In the Indian way of education, lessons had to be taught orally and fixed in the memories of the young, and so passed on from generation to generation. There were no lesson books or writings among tribes north of Mexico.

All that ancient history of early American heroes, wars, migrations, and diplomacies is lost now, except what science can rescue here and there. The rising generation of young Indians knows almost nothing about such matters, so the salvaging of Indian history is not going to be possible much longer.

Hiawatha, Mr. Hewitt learned, had a rascal brother who was a powerful chief. The brother hated Hiawatha and determined to crush him. One by one, Hiawatha's wife and children were killed, poisoned probably, in the long, determined family feud. All this time Hiawatha dared not fight back. His brother had the arrogant and feared strength of a gangster chief. Added to everything else the brother had the reputation of being a wizard. Even the powers of darkness seemed to be with him.

In baffled rage against his brother, Hiawatha turned cannibal. Mr. Hewitt comments on this by saying:

Things Longfellow Never Knew

Hiawatha was a real Indian. He lived in the sixteenth century.

The Hiawatha of history was a cannibal—but he reformed.

The Hiawatha of history deserves a place in a national hall of fame. He and another Indian genius established an Indian league of nations. From that political invention of the Indians, it is believed, Thomas Jefferson got the idea for a United States.

Hiawatha had two wives, but neither of them was named Minnehaha.

Longfellow shouldn't have gone to Schoolcraft's writings for his Indian history. Schoolcraft was muddled in some of his information.

"I doubt whether within the historic period of Iroquoian life cannibalism was a tribal custom. The whole structure of Iroquois government was exerted to prevent bloodshed. It seems rather that Hiawatha reverted to primitive ancestral ways. He would slay whatever unfortunate stranger crossed his path. And not only slay, but eat."

Hiawatha's sick madness of cannibal excesses made him an outcast. One day in the forest he had killed a man and was boiling water in the pot in his hut when he was startled by a vision. In the boiling water he saw a face looking up at him. The face was that of another Indian, Dekanawida, who had climbed on the roof of Hiawatha's lodge and was looking down the smoke hole.

To the unhappy Hiawatha this sudden appearance of the face was a mystic vision so impressive that he foreswore cannibalism then and there. Ready to see the world in a new light, he walked out into the forest. There Dekanawida approached him and talked about a dream of brotherhood, to band together the Iroquois tribes and eventually all the world.

For thirty years, the two Indian reformers worked to end warfare, murder, and strife. They were, Mr. Hewett says, like an Indian Messiah and St. Paul. Dekanawida evolved the plans. Hiawatha was his mouthpiece, eloquently arousing the tribes to the new cause. Some Indians today say that Dekanawida had a speech impediment, and therefore without Hiawatha he could never have given his message to the people.

Indian League of Nations

Out of the thirty years of political campaigning grew the remarkable League of the Iroquois. Five Indian nations in the region of New York and nearby Canada were banded together in this League of brotherhood and peace. Later a sixth nation was added. Each nation kept its independence. But each nation sent representatives to sit at a central council, to decide important matters. That was in its way the Congress of the Indian United States.

Only six tribes ever joined Dekanawida's and Hiawatha's league. But Mr. Hewitt thinks that the Indian reformers' dream may have had an even more far-reaching effect.

If Thomas Jefferson did not model the United States after the Indian league, where else did he get the idea? Nowhere in Europe was there such a government—a group of political organizations bound together securely, yet without sacrificing their independence.

AN INDIAN HOUSE OF REPRESENTATIVES

As Hiawatha and Dekanawida evolved it. The central figure is Dekanawida himself, and seated on either side are representatives of the five Iroquois nations. In the background appear to be the usual fringe types of any Congress—tourists, lobbyists, perhaps even reporters. This very beautiful panel is in the Wellesville, N. Y., Post Office.

If Mr. Hewitt is right in this speculation, then Hiawatha and Dekanawida deserve high pedestals in an American hall of fame.

Of all this sixteenth century Indian history, the poet Longfellow knew nothing. Longfellow never visited an Indian reservation in his life; so Alice Longfellow once stated plainly, to settle argument.

After all, Longfellow was a poet, not a scientist or historian. He did the best he could with the reference books of his day. The trouble was that scientific study of Indians was in a pioneer stage early in the nineteenth century. For his story of Hiawatha and for local color, Longfellow turned mainly to writings of an ethnologist named Henry Schoolcraft. This man Schoolcraft was one of the first to do scientific research among the Iroquoian tribes, and while he was an eager investigator, he was like a man wandering in a tremendous maze of strange languages and customs. Frequently, Schoolcraft got muddled, especially over the subtleties of Indian names and languages. Sometimes he put two and two together and made five or six of it without much doubting or hesitation.

So, Mr. Hewitt explains, when Iroquois Indians told Schoolcraft about their heroes Dekanawida and Hayenwatha, the latter name was the only one that stuck in Schoolcraft's memory. He caught and wrote down the name Hiawatha because it sounded to him vaguely like the name he had heard for an Indian god. By the time he got his notes shaped up for publication, Schoolcraft had mixed together not merely two characters, but three, to make one.

He had in the meantime gone among the Chippewa Indians of the Great Lakes country and heard all about their God of Life, so he added this Chippewa deity to his mixture of Hiawatha and Dekanawida. The result of mixing the three characters was as fantastic as if he had scrambled together everything he could find about Alexander the Great, Aristotle, and the Greek god Zeus.

In the composite Indian put together by Schoolcraft, very little Hiawatha except the name survived. The Song of Hiawatha as it turned out would better have been called the Song of Dekanawida, Mr. Hewitt points out. It is Dekanawida's thoughts on brotherhood that lift the literary "Hiawatha" to philosophic heights.

Poets have picked the wrong hero to immortalize more than once. A few years ago, Longfellow's poem on the midnight ride of Paul Revere was under critical fire. It was brought out then that the leading role in the Revolutionary adventure was taken by an ancestor of Col. Charles Dawes, Vice President of the Coolidge administration. Revere, patriot as he was and famous for many other achievements, was a secondary figure in the business of warning and signaling the Colonists, so the reports stated.

Hiawatha should have been called Dekanawida by Longfellow. The real career of the real Hiawatha would have made another great poem. And there

was no such girl as Minnehaha.

The real Hiawatha married twice but not to any lovely maid of the Dacotahs by the name of Laughing Water. Dekanawida devoted his life to his mission of bringing peace to the tribes, and nothing is said about his marrying.

It is believed that Longfellow got the singing name for Hiawatha's bride out of a book on the Sioux. In this book he read the legend about the beautiful waterfall in Minnesota known as the Minnehaha or Laughing Waters.

School children learn about Indians from Hiawatha, and that means that they get their introduction to Indian life as it was among Chippewa Indians, on the forest shores of Lake Superior. When Schoolcraft mixed a Chippewa god in with his Iroquois Indians to make Hiawatha, he gave him a Chippewa background. Schoolcraft found the Chippewas more interesting than the Iroquois. In fact, he became so intensely interested in one Chippewa that he married her.

When Longfellow studied the Schoolcraft legends, therefore, and wrote the lines beginning, "Give me of your bark, O Birch tree," he was describing a Chippewa canoe. An Iroquois would have made his canoe of slippery elm bark, for no canoe birch grew in New York State.

Longfellow's poem, as science sees it, is fantasy with a remote and confused historic background. But the spirit of "Hiawatha" is the spirit of the red man at his best. The forest life of the Chippewa described by the poet has given many a school child a glimpse into the Indian's lost world. And now science has given back to Dekanawida and Hiawatha their proper place in the roll of fame. So all's well that ends well.

Science News Letter, August 25, 1934

▼ RADIO ▲

THE DEPRESSION AND THE NATION'S HEALTH

an address by

Edgar Sydenstricker

Director, Public Health Activities, Milbank Memorial Fund

Wednesday, Aug. 29, at 3:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

PHYSIOLOGY

Curse of the Hapsburgs Claimed Spanish Prince

Alfonso's Son Inherited Fatal Bleeding Tendency Fom His Mother, Though Women are Never "Bleeders"

HEMOPHILIA, the hereditary disease of bleeding, that contributed to the death of ex-King Alfonso's fourth son, Prince Gonzalo, is one of the strangest of maladies.

It affects only the male but it is transmitted only by the female who herself does not have the difficulty. It thus skips a generation.

In the case of the ex-royal family of Spain, Queen Victoria, though herself not hemophiliac, nevertheless passed on to some of her sons the liability of severe and recurring bleeding. The eldest son, Prince Alfonso, who renounced his right to the now non-existent throne of Spain in order to marry a commoner, is also known to be a "bleeder," while the other two sons are reported as not being so afflicted.

In another way the "bleeding disease" has brought tragedy into the life of Spain's ex-royal family. Ex-King Alfonso in 1931 forbade his two daughters to marry because he realized the danger that they might transmit this ailment to some of their sons. This command broke off the engagement of the Infanta Beatriz to Prince Alvaro d'Orleans. By a coincidence it was the Infanta Beatriz who was driving at the time of the slight but fatal auto accident to Prince Gonzalo.

The disease also existed in the family of the last of the Romanoffs, Tsar Nicholas II. Alexis, the late Tsarevitch, was hemophiliac. It is said that the bleeding strain entered the royal families of Europe from the Hapsburgs, the ancient imperial family of Austria, and the disease has been called the "curse of the Hapsburgs."

Science has searched in vain for some simple method of determining whether or not a woman is a carrier of the ailment and is capable of passing it on to her sons. The only way to distinguish between those who carry and those who do not carry the hereditary strain is the practically uselesss method of waiting until sons and grandsons have been produced. Two tests, one of blood type and the other a reaction with cobra venom have been produced, but neither has proved successful.

Experiments by Dr. Carroll La Fleur Birch of the University of Illinois College of Medicine hold out hope that injections of one of the female sex hormones may be useful in treating the disease. Working on the theory that there must be some factor in the woman which suppresses the disease when it is present in her hereditary make-up, Dr. Birch hit upon ovarian extract as the probable element in the female mechanism that held the disease in abeyance. He therefore tried this substance in treating two boy "bleeders" with encouraging results. Other physicians did not have the same success but the experiments are in progress.

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PHYSICS

New X-Ray Method Makes Quick Analyses Possible

BY HOLDING a piece of metal up to a beam of X-rays it is now possible to tell quickly what are its chemical constituents. This is the seemingly magical method of analyzing metallic substances announced by Dr. L. V. Hamos of Stockholm.

The Swedish investigator has already built himself metallic "sandwiches" consisting of paper-like strips of metal piled one on top of the other. By shining X-rays at the laminated edge of the metal "sandwich" Dr. Hamos has been able to tell what kind of metal was used for each layer. In some cases the edge of the metal strips was only 1/250 of an inch thick.

Reporting his new method of chemical analysis to *Nature*, Dr. Hamos explains that when the initial beam of X-rays (all of the same wavelength) strikes the laminated edge it produces secondary X-rays, which come off from each of the various kinds of metal illuminated by the primary beam. These secondary X-rays are characteristic for

each different kind of metal known, so that if the "fingerprint rays" could be sorted out in some fashion a chemical identification is possible.

The apparatus for analyzing the telltale secondary X-rays consist of a crystal of pure salt shaped into the form of a cylinder. This cylinder does for the mixed-up secondary X-rays what an ordinary prism of glass or a spectrum grating does for white light—it breaks it up into its colors, or wavelengths.

As the X-rays come from the salt crystal they strike a photographic plate at different places and leave marks which distinguish each metal present in the original sample of metal.

Dr. Hamos is carrying out his research in the Rikmuseets Mineralogiska Avdelning in Stockholm. His method is adapted for the rapid analysis of metals and metallic ores where the sample's appearance must not be changed.

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AIRPLANE NOISE ANALYZED DURING FLIGHT

The fact that an airliner is noisy is common knowledge, but the elements of which the noise is composed are of great interest to scientists because they may show the way to curing airplanes of many of their sound ills. Westinghouse engineers are taking data on all the sound vibrations occurring in an airliner cabin while the ship itself is in midair.

PHILATELY

Government Now Honors Science on Postage Stamps

WITH the issue on Aug. 15 of the General Goethals 3-cent Canal Zone stamp, commemorating the twentieth anniversary of the opening of the Panama Canal, another phase of American science was dedicated to the mails.

Postage stamps have recorded history for the people more widely than history books, but most of their illustrations have been kings and presidents.

When the new commemorative stamp went on sale at Colon, the Post Office Department of the Canal Zone placed on visual record George Washington Goethals, chief engineer and administrator of one of the world's greatest engineering feats.

His first two names bring to memory another engineer and builder, who was later to become the first president of the United States. First a surveyor, and then a civil engineer, George Washington built power dams and canals, many of which are still visible in Virginia. He appears on the standard 2-cent and 3-cent U. S. postage stamps.

Benjamin Franklin, whose likeness appears on the present 1-cent stamp, is better known for his scientific work than Washington. As a pioneer in the field of electricity, much of the credit for our present comforts should be given him.

Thomas Jefferson, although chiefly famed as a barrister, diplomat and statesman, was a student of the sciences. He is said to have made use of higher mathematics, especially the calculus, all through his life, and he studied fossil bones in the White House East Room.

There is a custom in this country which forbids the use of any living person's picture on a United States postage stamp. Even a living person's name was once barred. Because of the importance attached to Lindbergh's flight across the Atlantic in 1927, a 10-cent stamp bearing his name made him the first living man to be immortalized by the Post Office Department. Two years later the rule was broken a second time, when a postage stamp appeared which carried the name of Thomas A. Edison. This issue honored the fiftieth anniversary of the first Edison electric light.

Stamps are used for other purposes than postage. For the benefit of game birds, especially ducks, a dollar hunting license stamp will be issued, the receipts to be used for the development of bird sanctuaries. J. N. ("Ding") Darling, noted cartoonist and now chief of the U. S. Bureau of Biological Survey, designed the stamp.

Foreign countries have given philatelic honors to their famous scientists. The physicist Volta, pioneer in electricity for whom the "volt" was named, was commemorated by Italy in a stamp issue. Pasteur, father of bacteriology, and Berthollet, the chemist, have both appeared on French stamps.

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PHYSICS

Speech "Compressed" To Carry Across Atlantic

USE OF the radio-telephone for commercial communication with Europe is commonplace today. But few people who sit down in New York and call London over the air realize the tricks of electrical engineering which make possible the proper transmission of their voices across three thousand miles.

Radio telephone users do not know that voice, for example, must first be "compressed" before it is sent out on the radio waves and then "expanded" back to something like its normal characteristics at the receiving end.

Transatlantic telephone companies use a device called a compandor to raise the energy in the voice tones so that they can more successfully compete with static on their lightning-like journey to Europe.

Ordinarily the energies coming into a radio telephone may have a range from

one to 10,000,000. Some are very weak and some are very loud. The weak vowels and weak parts of strong vowels can easily be "lost" in the roar of static.

With the compandor, sound intensities to be transmitted are squeezed, or compressed, so that the ratio of weak to strong sounds is only one to thirty-two. With this smaller variation in intensity the transmitted signal can "stand on its own legs" and fight back when severe static roar comes along.

At the receiving end of the radio telephone is an expandor which takes the compressed signals and spreads them out into their original intensity range.

The value of "pepping up" the speaking tones to higher intensities has improved transatlantic radio telephone transmission as follows:

1. Enabled successful transmission of messages for a longer percentage of time, much of which was previously unusable for commercial purposes.

2. Reduced the static noise impairment of transmission during moderate or heavy static.

3. Made possible an economy of power necessary for transmission during light static.

The technique of "voice squeezing" for radio-telephone and its benefits to transatlantic telephone users are described in the current issue of the *Bell System Technical Journal* by Dr. R. C. Mathes and Dr. S. B. Wright.

Science News Letter, August 25, 1934

ZOOLOGY

Rattlesnake's Rattles Not Part of Its Skin

RATTLESNAKES are not born with "buttons" on the ends of their tails. And their rattles are not simply thickened parts of their skins. These contradictions of two universally accepted articles of rattlesnake doctrine are upheld by L. M. Klauber of the Natural History Society of San Diego.

Furthermore, said Mr. Klauber, there is good evidence to believe that under natural conditions every time a rattler sheds its skin it does add a new rattle to its string, although most natural history books now declare that this does not always happen. The trouble with the books on this point, the San Diego zoologist said, is that their statements are based mainly on the skin-shedding habits of rattlers in captivity, which are usually not normal or healthy.

The "button" we see on the tip of a rattler's string of rattles, Mr. Klauber discovered through close observation of new-born little snakes, makes its appearance only after the snakeling has shed its birth-skin, which it does when it is only a few hours old. Before then, it bears a birth-button, or "prebutton" as Mr. Klauber has named it. This is so thin and fragile that it is not able to cling to the tail-tip when the skin is shed, but comes off with it.

Although related to the skin in origin, the rattles are not merely thickened parts of the skin, Mr. Klauber further stated. They are quite distinct from it, being formed of a hard, clay-like substance which is secreted by a definite body of tissue near the tail-tip, which he calls the rattle matrix. At first soft and doughy, the rattle dries as it matures, and springs away from the matrix that formed it. A fold of skin overlaps and holds the edge of the last-formed rattle, while the rest of the mechanism is held only by its interlocking joints, which permit enough free play to make the rattle buzz when the angry or excited snake vibrates its tail-tip.

Science News Letter, August 25, 1934

ARCHAEOLOGY

Oklahoma's Mound Builders Wore Fancy Stone Earrings

See Front Cover

SOME of the costume jewelry worn in ancient America was amusing stuff.

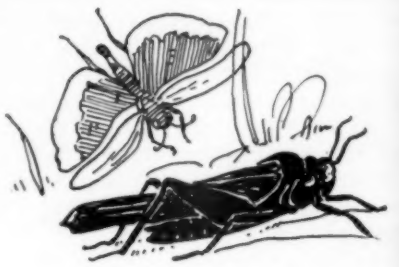
From eastern Oklahoma comes a stone earplug made by an Indian jeweler with interesting ideas of design. The plug, unfortunately broken, is ringed with a maze-like pattern of lines. Once you see it the right way, there is a series of Indian profiles in the puzzle picture.

The plug is from one of the mounds recently explored by Forrest E. Clements of the University of Oklahoma. The mounds revealed copper blades, well-made cloth, and other signs showing that a high Mound Builder culture flourished in Oklahoma.

Science News Letter, August 25, 1934

ENTOMOLOGY

NATURE RAMBLINGS by Frank Thone



Double Trouble

UNABATED heat and drought over most of the country's major grain areas resulted in indirect as well as direct damage to the crops, by encouraging some of the most destructive of insect pests.

A survey by the bureau of entomology, U. S. Department of Agriculture, shows that the grasshopper situation throughout the West is still very serious. With late summer coming on, the insects are maturing and preparing to lay their eggs in the baked soil. There they will remain during the winter, and if the season is as warm and open as it was during the winter of 1933-34, the summer of 1935 can be expected to be another bad 'hopper year.

Chinch-bugs, though defeated in their effort at ground invasion of the cornfields after the small-grain crops had either been harvested or dried out by the drought, took to the air and entered the corn in considerable masses. They have not done the present year's crop serious harm in most places, but the insects now feeding in the cornfields will lay eggs, and the second generation of bugs, sheltered among the wild grasses in fencerows and on roadsides, will be ready for major mischief early next summer, unless a chill, rainy autumn diminishes their numbers.

Wheat in the Ohio valley was subjected to a severe attack of Hessian fly, and near the headwaters of the Ohio there was a serious outbreak of the black grain-stem sawfly. Red spider, favored by the drought, has been attacking a great variety of plants over all the eastern half of the country except the Southeastern states and New England. Corn earworm has been troublesome over practically the entire United States.

Science News Letter, August 25, 1934

First Glances at New Books

Physics

RELATIVITY, THERMODYNAMICS AND COSMOLOGY—Richard C. Tolman—*Oxford,* xv, 502 p., $8.50. In a book which shows years of hard work, careful judgment of material and completeness of detail Dr. Tolman sums up, for what will probably be many years to come, the effects of applying relativity considerations to thermodynamics. Where the results of this new branch of thermodynamics touch cosmology Dr. Tolman draws on his own mathematical researches. With some men this "liberty" might be a handicap but in the present case the author could not have chosen a finer authority. Latest volume in the well-known International Series of Monographs on Physics, the book—because of its price and technical nature, is probably not destined for popular consumption even among physicists. But it should be a classic reference of any good library for a long time to come.

Science News Letter, August 25, 1934

Physics

DISSOCIATION ÉLECTROLYTIQUE—Pt. 1, by L. Gay and P. Jaulmes, 34 p., 10 fr.; Pt. 2, by L. Gay and P. Jaulmes, 55 p., 15 fr.: Pt. 3, by L. Gay and R. Lautié, 20 p., 7 fr.—*Hermann et Cie., Paris.*

Science News Letter, August 25, 1934

Medicine—Physics

ELECTROKINETIC PHENOMENA AND THEIR APPLICATION TO BIOLOGY AND MEDICINE—Harold A. Abramson—*Chemical Catalog Co.,* 331 p., $7.50. Far too technical for the average lay reader, this book has much of interest for the physician and biologist.

Science News Letter, August 25, 1934

Physics

THE GYROSCOPE (ITS LAWS AND MYSTERIES—Theodore Bodde—Pei-yang Press, Tientsin-Peiping—23 p. Explanation of how a gyroscope works, without use of advanced mathematics.

Science News Letter, August 25, 1934

History—Law

STUDIES IN THE ADMINISTRATION OF THE INDIANS IN NEW SPAIN—Lesley Byrd Simpson—*Univ. of California Press,* 130 p., 12 plates, 2 maps, $1.50. These early laws which regulated relations between Indians and Spaniards have hitherto been rather inaccessible because of the difficulty in reading the old documents in manuscript form. In transcribing the laws of Burgos of 1512, which form the first section of this book, the author has modernized spelling and punctuation; in part two, the history of the civil congregation of the Indians (1590-1605), has been condensed and translated into English.

Science News Letter, August 25, 1934

Science

THE JEW IN SCIENCE—Louis Gershenfeld—*Jewish Publication Society of America,* 224 p., $2.75. The contribution of the Jewish race in science through the ages and in modern times. It may surprise not a few Gentiles to learn that fifteen scientists of Jewish descent have so far been awarded the Nobel Prize; five in chemistry, five in physics and five in medicine.

Science News Letter, August 25, 1934

Psychoanalysis

OUTLINE OF CLINICAL PSYCHOANALYSIS—Otto Fenichel—*The Psychoanalytic Quarterly Press and Norton,* 492 p., $5. Translated by Bertram D. Lewin and Gregory Zilboorg. Physicians treating mental and nervous diseases will be interested in this thorough discussion of psychoanalysis as a method of treatment. The book is not for lay readers, however.

Science News Letter, August 25, 1934

Anthropology

THE HYPOTROCHANTERIC FOSSA OF THE FEMUR—Ales Hrdlicka—*Smithsonian Institution,* 49 p., 14 pl., 40c. A critical physical-anthropological study of the occurrence and phylogenetic significance of a furrow in the human and higher primate thighbone.

Science News Letter, August 25, 1934

Ornithology

BIRD PORTRAITS IN COLOR—Thomas Sadler Roberts—*University of Minnesota,* 90 color plates, text, $3.50. Concise popular text descriptions front each full-page plate, superbly done in colors by a group of the leading American bird painters. A better gift book for any person interested in birds, from high school age on up, would be difficult to imagine.

Science News Letter, August 25, 1934

Photography

THE ART OF COLORING PHOTOGRAPHIC PRINTS—J. Carroll Tobias—*American Photographic Pub. Co.,* Boston, 108 p., $1.50. Complete instructions for the amateur.

Science News Letter, August 25, 1934

Industrial Hygiene

DEATH RATES BY OCCUPATION BASED ON DATA OF THE U. S. CENSUS BUREAU 1930—Edited by Jessamine S. Whitney—*National Tuberculosis Association,* 32 p., $1.

Science News Letter, August 25, 1934

VITALISM
and
MECHANISM
A DISCUSSION
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HERBERT V. NEAL
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First Glances at New Books

Economics

AMERICA'S CAPACITY TO PRODUCE—Edwin G. Nourse and Associates—*Brookings Institution,* 597 p., $3.50. Such books as this provide necessary information in the making of blueprints for building America's economic future, whether it is called planning or regimentation. Fat in facts and pages though it is, this volume is only the first in a series of four being prepared by the Institute of Economics on the distribution of wealth and income in relation to economic progress. Reading these pages renews one's confidence that the application of scientific methods to the economics fields will be fruitful as they have in the fields of physical and natural sciences.

Science News Letter, August 25, 1934

Economics

THE AMERICAN VEGETABLE-SHORTENING INDUSTRY, ITS ORIGIN AND DEVELOPMENT—G. M. Weber and C. L. Alsberg—*Food Research Institute, Stanford Univ.,* xii, 359 p., $3.50. A thorough-going study of the development of lard substitutes of vegetable origin in the United States, and of the economic interplay of the industry with the raising of corn and hogs. Useful appendices include a history of the technology, an account of shortening action, and numerous tables.

Science News Letter, August 25, 1934

Economics

INTERNATIONAL ECONOMIC RECOVERY—H. G. Moulton—*University of Minn.,* 25 p., 25c. A lecture by the president of the Brookings Institution who speaks with authority.

Science News Letter, August 25, 1934

Economics

THE SCANDINAVIAN UNEMPLOYMENT RELIEF PROGRAM—C. J. Ratzlaff—*University of Pennsylvania Press,* 211 p., $2.

Science News Letter, August 25, 1934

Economics

RAILROAD MERGERS—John Will Chapman—*Simmons-Boardman Publishing Co.,* 153 p., $3.

Science News Letter, August 25, 1934

Ornithology

BIRDS AND BIRDHOUSES—Bob Becker—*Chicago Tribune,* 96 p., 30c. This pamphlet gives some notion of the qualities of various possible bird neighbors and what kind of quarters they prefer, so that the person with good will toward birds will be able to elect the friends he prefers and build to attract them as tenants.

Science News Letter, August 25, 1934

Ornithology

BIRDS—Julius King—*Harter Publishing Co.,* 3 v., 62 p., each vol., 10c each, plus postage. Little books in large print, chattily telling the younger audience interesting facts about familiar birds, adding a bit of verse dedicated to each one. The signature of Allan Brooks on the many colored illustrations vouches at once for scientific accuracy and artistic merit.

Science News Letter, August 25, 1934

Zoology

A HANDBOOK OF REPTILES AND AMPHIBIANS OF THE PACIFIC STATES—Joseph R. Slevin—*California Academy of Science,* 73 p., 11 pl., 75c. This convenient handbook, well "keyed" and well illustrated, will be useful both to students in West Coast schools and colleges and to herpetologically-inclined visitors from other parts of the country.

Science News Letter, August 25, 1934

Ichthyology

THE FISHERMAN'S GUIDE — Bob Becker—*Chicago Tribune,* 81 p., 30c.

Science News Letter, August 25, 1934

Botany

A LABORATORY GUIDE FOR A COURSE IN GENERAL BOTANY—Lee Bonar, Richard M. Holman and Lucile Roush—*Wiley,* 112 p., $1.25.

Science News Letter, August 25, 1934

Biology-Teaching

WORK-TEST BOOK TO ACCOMPANY THE NEW EDITION, BIOLOGY AND HUMAN WELFARE—James E. Peabody—*Macmillan,* 157 p., 40c.

Science News Letter, August 25, 1934

Entomology

THE EXTERNAL ANATOMY OF THE RED DATE SCALE PHOENICOCOCCUS MARLATTI COCKERELL, AND ITS ALLIES—F. S. Stickney—*Govt. Print. Off.,* 163 p., 15c.

Science News Letter, August 25, 1934

Science

SCIENCE FOR A NEW WORLD—Arranged by Sir J. Arthur Thomson, edited by J. G. Crowther—*Harper,* 398 p., $3.75. Fifteen authorities write essays on the various fields of science. Prof. George D. Birkhoff of Harvard discusses mathematics, Prof. A. S. Eve of McGill explains the trend of physics, Prof. Max Planck, recently of the University of Berlin speaks with authority on causality in nature, and the other authors are largely British.

Science News Letter, August 25, 1934

General Science

OFFICIAL HANDBOOK OF EXHIBITS IN THE DIVISION OF THE BASIC SCIENCES, THE HALL OF SCIENCE—*Century of Progress,* 184 p., 30c each postpaid, by mail; 10c each over the counter; 10c each plus postage on quantity orders. Condensed descriptions of all the basic science exhibits in Chicago's famous Hall of Science. This book is intended to serve the more careful sightseer as well as the student of science as they go through the endless aisles. It will be useful also later on, as a memorandum of what one has seen.

Science News Letter, August 25, 1934

Radio

SO-O-O-O YOU'RE GOING ON THE AIR—Robert West—*Rodin Publishing Company,* 215 p., $1.75. A book written in popular style for those interested in broadcasting.

Science News Letter, August 25, 1934

Vocational Guidance

PROCEEDINGS OF THE MINNESOTA STATE CONFERENCE ON VOCATIONAL GUIDANCE—Edited by Donald G. Paterson—*Univ. of Minnesota Press,* 24 p., 50c.

Science News Letter, August 25, 1934

Engineering

TESTS OF THE FIRE RESISTANCE AND STRENGTH OF WALLS OF CONCRETE MASONRY UNITS—Carl A. Menzel—*Portland Cement Association,* 215 p. Book prepared for limited distribution only. Copies available without charge to libraries and technical societies.

Science News Letter, August 25, 1934

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